

## Description

# [HOLDER OF PHOTOMASK]

### CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the priority benefit of Taiwan patent application number 092114456 filed on May 8, 2003.

### BACKGROUND OF INVENTION

[0002] 1. Field of the Invention

[0003] The present invention provides an apparatus of holder of photomask for holding the photomask, which is placed in the transfer box and to be exposed by projecting optical-light during process of manufacturing semiconductor. By means of the long cambered surface of the protrusion to uphold photo mask, it prevents the protrusion from friction that with the Chromium (Cr) deposition on the bottom surface of the photomask therein in consequence of not creating any dust particle.

[0004] 2. Description of the Related Art

[0005] Heretofore, a conventional holder 10 of the photomask

201 (as illustrated in Fig. 1 & 2) is placed in a base 20 of the transfer box. The holder 10 is U-shaped with several falciform members 101 and several protrusions 102. The holder 10 is made of plastics in one-piece by eject forming, and the protrusion 102 is rendered to uphold photomask 201. As the contacting area of top of the protrusion 102 with photo mask 201 is rather large and in plastics constitution, the protrusion 102 is not featured with attrition resisting and high hardness. Frequently, owing to inspection manipulating in movement and reposition as well as pick-and-place of photomask 201 on holder 10 in process operation, the protrusion 102 is subject to friction with the Chromium (Cr) deposition on the bottom surface of the protrusion 102, which served as circuit protecting shroud layer, and results in creating dust particle. Wherein the Chromium (Cr) deposition on the bottom surface is extremely precise circuit protecting shroud layer so jointwith a jacket membrane 201a to stop the dust particle off the focus of photomask 201. If the surface of the jacket membrane 201a is adhered dust particle abundantly, the jacket membrane 201a must be replaced to prevent wafer from failure in exposure. However, the unit price of jacket membrane 201a is expensive so that draw-

back in cost increasing due to step up the replacement frequency of jacket membrane 201a as failure in reducing the possibility of friction. That friction occurs between the holder 10 and the photomask 201in consequence of causing dust particle.

[0006] Furthermore as shown in Fig. 1, 2 and 3respectively, those are a perspective view, a front sectional view and a testing waveform chart of photo mask holder. The friction between the protrusion 101 and photomask 201, it make the protrusion 101 have been wearied and abraded to cause dust particle, then the dust particle creates the unbalance and unflatness of the photomask 201 on the protrusion 101. Thus, it necessitate the repeated adjusting the coordinating position of sucking disk with the photomask 201 to let robot arm use sucking disk to attract the photomask 201 successfully and movement in clean room. If the coordinating position of sucking disk with the photomask 201 is not well adjusted, the sucking disk cannot suck the photomask 201 to move and after a certain period of inspecting process, it can be seen that the seriously unbalanced situation of the protrusion 101 due to the dust particle created by abrading the protrusion 101. And, the testing waveform chart presents some pul-

sation in big amplitude and to retard the movement in process of photomask 201.

[0007] Moreover, the transfer box is functioned to ensure the cleanliness within be better than that outside. So, the less the dust particle be caused inside, the better is the function. Owing to the current contrived structure, the transfer box is suffered from dust particle of attrition mentioned above. Thus, it creates cost escalation and extra work attributed to periodic cleansing regularly.

## SUMMARY OF INVENTION

[0008] The present invention has been accomplished under the circumstances in view. The compound material with high hardness and attrition resisting has been tried. Although the compound material can be able to prevent from causing dust particle in friction, its brittleness is not good enough to form falciform member 101 of the holder 10 through one-piece ejecting forming. It is greatly possible to be cracked and damaged due to shake and crush of the photomask 201. Besides, its cost is rather expensive. From consequence of further experiment, the various materials and adoption of special structure in protrusion is eventually applied to prevent it from friction creating dust particle as well as to reduce the cost.

## **BRIEF DESCRIPTION OF DRAWINGS**

- [0009] Fig. 1: is a perspective view of photomask holder with photomask placed hereon of the conventional invention.
- [0010] Fig. 2: is a front sectional view of photomask holder with photomask placed hereon of the conventional invention.
- [0011] Fig. 3: is a testing waveform chart in balanced mode of photomask holder of conventional invention.
- [0012] Fig. 4: is a perspective view of photomask holder of the present invention.
- [0013] Fig. 5: is a front sectional view of photomask holder of the present invention.
- [0014] Fig. 6: is an exploded perspective view of photomask holder in the preferred embodiment of the present invention.
- [0015] Fig. 7: is a testing waveform chart in balanced mode of photomask holder of the present invention.

## **DETAILED DESCRIPTION**

- [0016] Referring to fig. 4 and 5, which are a perspective view and a front sectional view of photomask holder of the present invention respectively. A protrusion 40 is made from PEEK and VESPEL material with attrition resisting and high hardness. On the side of the protrusion 40 is shaped in inclina-

tion toward center with the top in long cambered surface as supporting ridge 41. And, at distal end of the supporting ridge 41, a pedestal 40a is given to jointly integrate with a through hole 50a of a holder 50 so that the protrusion 40 is positioned on the holder 50 and the photomask 201 can be placed on the supporting portion 41 of the protrusion 40 thereon. Thus, by means of the supporting ridge 41 with the long cambered surface of the protrusion 40 to uphold photomask 201, the contacting area of friction is reduced. Moreover, the protrusion 40 with the characteristics of attrition resisting and high hardness enable the protrusion 40 to prevent from friction with the Chromium (Cr) deposition on the bottom surface of the photomask 201 therein in consequence of not creating any dust particle.

- [0017] Wherein, the shape of pedestal 40a (refer to Fig. 4 and 6) at the distal end of the supporting ridge 41 on the protrusion 40 can be adapted to match the structure of the through hole 50a on the holder 50. Or, the protrusion 40 can also constructed without pedestal 40a to directly adhere the protrusions 40 on the surface of the holder 50.
- [0018] Further referring to fig. 5, 6 and 7, which are a front sectional view, an exploded perspective view and a testing

waveform chart in balanced mode of photo mask holder of the present invention respectively. The protrusion 40 is made from material with attrition resisting and high hardness. And, by means of the supporting ridge 41 with the long cambered surface of the protrusion 40 to uphold photomask 201, it can prevent the protrusion 40 from friction with the bottom side of the photomask 201. Then, the supporting ridge 41 of the protrusion 40 is hard to susceptible to causing dust particle and to have a more stability of photomask 201 on the protrusion 40. Thus, it is not necessary to repeated adjust the coordinating position of sucking disk with the photomask 201 to let robot arm use sucking disk to attract the photomask 201 successfully and movement of photomask 201 in clean room. And, the testing waveform charts of photomask 201 present pretty balanced and stable condition with limited tolerance of local pulsation in small amplitude. Thus, it proves that the protrusion 40 creates no dust particle due to suffering from no serious attrition. Additionally, by means of protrusion 40 upholding the photomask 201, it remain the photomask 201 in manner of better balance and stability without any effect in operation of moving the photomask 201.

- [0019] Therefore, the protrusion 40 on the holder 50 of the present invention can definitely offer the effect in stable disposition of photomask 201, as well as prevent the protrusion 40 from dust particle caused by friction.
- [0020] Although a particular embodiment of the invention has described in detail for purpose of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.